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10/560,447	12/12/2005	Paulus Martinus Catharina Hesen	NL030692US1	3088

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EXAMINER

CHHAYA, SWAPNEEL

ART UNIT	PAPER NUMBER
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2822

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ip.department.us@nxp.com

Office Action Summary	Application No. 10/560,447	Applicant(s) HESEN ET AL.	
	Examiner SWAPNEEL CHHAYA	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Heinlen et al. (U.S. Patent 3736367).

Regarding claim 1.

A lead frame provided with

A frame (2) having a first (6,18, 24) and a second (10,18, 24) connection conductor which connection conductors are each connected to the frame and (Fig. 1-5 column 2 lines 25-45)

Provided with a non-engaging end portion (24), where, after deformation, the end portion of the second connection conductor can be positioned opposite the first connection conductor (Fig. 1-5 column 2 lines 25-45)

A semiconductor element can be placed between said connection conductors, (Fig. 1-5 column 2 lines 55-65)

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the end portion of the second connection conductor within the frame being positioned outside the extension of the first connection conductor, where, after deformation, the second connection conductor adapted to deform such that, by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion,
(Fig. 4-5 column 2 lines 25-45 column 3 lines 50-55)

~~characterized in that the end portion of the second connection conductor within the frame is positioned outside the extension of the first connection conductor and can be brought to a position opposite the position of the semiconductor element by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion.~~

Regarding claim 2.

A lead frame as claimed in claim 1,
characterized in that the end portion (24) of the second connection conductor has been brought to a position opposite the position of the semiconductor element by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion. (Fig. 4-5 column 2 lines 25-45)

Regarding claim 3.

A method of manufacturing a semiconductor
device comprising the steps of:

- providing a semiconductor element having a first and a second electric connection region which connection regions are situated at opposite sides of the semiconductor element (Fig. 1-5 column 2 lines 55-65)
- providing a lead frame as claimed in claim 2 (see above)
- fitting the semiconductor element between the end portions of the first connection conductor, where connection means are used to make electro-conductive connections between the connection regions and the end portions. (Fig. 1-5 column 2 lines 55-65)

Regarding claim 4.

A method of manufacturing a semiconductor device comprising the steps of:

- providing a semiconductor element having a first and a second electric connection region which connection regions are situated on opposite sides of the semiconductor element; (Fig. 1-5 column 2 lines 55-65)
- providing a lead frame (2) having a frame with a first and a second connection conductor which connection conductors are each connected to the frame and provided with an exposed end portion; (Fig. 1-5 column 2 lines 25-45)
- applying the semiconductor element to the end portion of the first connection conductor an electro-conductive connection between the first connection region and the end portion being made by using a connection means; (Fig. 1-5 column 2 lines 55-65)
- moving the end portion of the second connection conductor to a position outside the plane of the frame and opposite a location for the second connection region of the

semiconductor element (Fig. 3-5 column 2 lines 25-65)

- making an electro-conductive connection between the second connection region and the end portion of the second connection conductor by using a connection means, characterized in that the end portion of the second connection conductor within the frame is positioned outside the extension of the first connection conductor and is brought to a position opposite the position for the second connection region of the semiconductor element by bending along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion. (Fig. 3-5 column 2 lines 25-65 column 3 lines 35-55)

Regarding claim 5.

A method as claimed in claim 4,

characterized in that the end of the end portion of the second connection conductor is bent through approximately 90 degrees along the bending axis out of the plane of the frame, and the end of the end portion is bent, along a further bending axis extending substantially parallel to the bending axis and at a distance therefrom corresponding approximately to the thickness of the semiconductor element, through an angle of approximately 90 degrees to the position of the semiconductor element (Fig. 3-5 column 3 lines 35-54)

Regarding claim 6.

A method as claimed in claim 5,

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characterized in that the end portion of the second connection conductor is bent along the further bending axis or along another bending axis in such a manner that said end portion extends obliquely in at least one direction with respect to the end portion of the first connection conductor which contains the position for the semiconductor element (Fig. 3-5 column 3 lines 35-54)

Regarding claim 7.

A method as claimed in claim 4, characterized in that the semiconductor element is slid between the connection conductors after the end portion of the second connection conductor has been bent to a position opposite the location for the second connection region of the semiconductor element and opposite the end portion of the first connection conductor, the element being clamped between the connection conductors. (Fig. 1-5 column 2 lines 55-65)

Regarding claim 9.

A method as claimed in claim 3, characterized in that before the semiconductor element is slid between the connection conductors, the end portion of the first connection conductor is maintained in a depressed position by means of a pressure member, until the semiconductor element has been slid between the connection conductors. (Fig. 1-5 column 2 lines 55-65)

Regarding claim 10.

A device for carrying out a method as

claimed in any one of claims 3 through 9, characterized in that the device comprises:

- a transport mechanism (4) for a lead frame with at least two connection conductors

(Fig. 1-5 column 2 lines 25-45)

- positioning means for positioning a semiconductor element (Fig. 1-5 column 2 lines 25-65)

- pusher means for pushing the semiconductor element in between the two connection conductors (6, 8, 10, 18) of which one is bent to a position above the position of the other one (Fig. 1-5 column 2 lines 55-65), please note that the pusher member is implicitly stated in lines 55-65 because the chip is “resiliently” held in position and the thickness increases, which means that the element increases the size of a chip and the metal that the lead is made from is not malleable enough to enable the placement of the transistor

means for bending an end portion of at least one of the connection conductors along a bending axis which makes an oblique angle with the longitudinal axis of the end portion.

(Fig. 4-5 column 2 lines 25-45 column 3 lines 50-55)

Regarding claim 11.

A device as claimed in claim 10,

which further comprises means for bending an end portion of at least one of the

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connection conductors along a bending axis which makes an oblique angle with the longitudinal axis of the end portion. (Fig. 3-5 column 3 lines 35-55)

Regarding claim 12.

A device as claimed in claim 10,
characterized in that it comprises pressure means for pressing downward one of the conductor tracks during the pushing against the semiconductor element (Fig. 1-5 column 2 lines 55-65), please note that the pusher member is implicitly stated in lines 55-65 because the chip is “resiliently” held in position and the thickness increases, which means that the element increases the size of a chip and the metal that the lead is made from is not malleable enough to enable the placement of the transistor

Regarding claim 13.

A semiconductor device comprising:

- a semiconductor element which is provided with a first and a second electric connection region, which connection regions are situated on opposite sides of the semiconductor element (Fig. 1-5 column 2 lines 55-65)
- a first connection conductor (6, 8, 10) having a contact, and facing away therefrom, an end portion (18) which is electro-conductively connected to the first connection region (Fig. 1-5 column 2 lines 25-67)
- a second connection conductor (6, 8, 10) having a contact, and facing away therefrom, an end portion (18) which is bent along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion, such that the end portion is situated

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opposite the second electric connection region, with which it is electro-conductively connected, while the contact is situated in the same plane as the contact of the first connection conductor (Fig. 3-5 column 2 lines 25-65 column 3 lines 35-55)

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an isolating envelope which leaves contacts facing way from the end portions of the connection conductors uncovered.

Regarding claim 15. A semiconductor device as claimed in claim 13, characterized in that:

- the semiconductor element is a semiconductor transistor with a third connection region (Fig. 1-5 column 2 lines 55-65)
- a third connection conductor (6,8,10) is present, which has a contact, and facing away therefrom, an end portion (18) which is bent along a bending axis which is at an oblique angle with respect to the longitudinal axis of the end portion, such that the end portion is situated opposite the third electric connection region, with which it is electro-conductively connected, while the contact is situated in the same plane as the contact of the first connection conductor;(Fig. 3-5 column 3 lines 35-54)
- the second (6) and the third connection (10) conductor are situated on either side of the first connection conductor (10) (Fig. 1-5)

Regarding claim 16, A semiconductor device as claimed in claim 13, or a lead frame as claimed in claim 1, characterized in that the first connection conductor is provided with a hole at a distance from the position for the semiconductor element. (Fig. 1)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heinlen et al. (U.S. Patent 3736367) as applied to claim 13 above in view of Sakamoto et al. (U.S. Patent 6975022).

Regarding claim 8. Heinlin discloses:

A method as claimed in claim 3, characterized in that

- a lead frame is chosen in which the first connection conductor is provided with a hole (36) at a distance from the position of the semiconductor element (Fig. 1)

Heinlin discloses the claim except for the semiconductor element being placed on the hole and fixed by means of a suction device and the pushing means.

Sakamoto discloses:

- the semiconductor element (15) is placed on the hole and fixed by means of a suction device (24, V) present below the hole, after which the semiconductor element is pushed between the connection conductors by means of a pusher member (Fig. 1-5-11 column 8 lines 30-60 column 9 lines 10-15)

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It would have been obvious to one having ordinary skill in the art at the time the invention was made to implement a suction device, and a pusher member as taught by Sakamoto, since *Sakamoto* states at column 8 lines 30-60 that such a modification would aid in mounting and fixing the semiconducting device.

Regarding claim 14.

A semiconductor device as claimed in claim 13, characterized in that:

Sakamoto discloses:

- the semiconductor element is a semiconductor diode (Fig. 1-5-11 column 12 lines 9-11)

Heinlen discloses:

- The second connection conductor is u-shaped or j-shaped prior to bending (Fig. 1)

(and

- the contacts of the connection conductors are in line with one another (Fig. 1-5)

Heinlin in view of Sakamoto discloses the claimed invention except for the oblique angle range of the lead frame. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use such a range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Response to Arguments

5. Applicant's arguments filed 10/31/2007 have been fully considered but they are not persuasive.

Applicant argues: Applicant respectfully traverses the Section 102(b) rejection of claims 1-7, 9-13

and 15 because the cited portions of the Heinlen reference do not correspond to the claimed invention which includes, for example, aspects directed to the end portion of the second connection conductor being brought to a position opposite the position of the semiconductor element by bending along a bending axis that is at an oblique angle with respect to the longitudinal axis of the end portion. The cited portions of Heinlen do not teach that the end portion 18 (having contact arm 15 and contact arm 20 with tip 24) is bent along an axis that is at an oblique angle with respect to the longitudinal axis of the end portion (i. e., bent along an axis that is neither perpendicular nor parallel to the longitudinal axis of the end portion).

The Heinlen reference teaches a specific series of bends that result in the tip 24 being located above heat sink 4, each of these bends is along an axis that is either perpendicular or parallel to the longitudinal axis of the tip 24 (Heinlen's tip 24 is asserted by the Office Action as corresponding to the claimed end portion of the second connection conductor). More specifically, contact arm 20 is bent upward at bend 50 (which is along an axis that is perpendicular to the longitudinal axis of the tip 24), the tip 24 is then formed by providing a downward bend at 52 (which is also along an axis that is perpendicular to the longitudinal axis of the tip 24). Next the contact arm 15 is bent upward at bend 54 (which is along an axis that is parallel to the longitudinal axis of the tip 24), and finally the contact arm 15 is bent at bend 60 (which is along an axis that is perpendicular to the longitudinal axis of the tip 24) to place the tip 24 over the heat sink 4. See, e.g., Figures 2-5 and Col. 3:38-50. Thus, none of the bends taught by the cited portions of the Heinlen reference are along an axis that is at an oblique angle with respect to the longitudinal axis of the end portion as in the claimed invention.

Accordingly, the Section 102(b) rejection of claims 1-7, 9-13 and 15 is improper and Applicant requests that it be withdrawn.

The applicant argues that none of the bends of the Heinlen reference have bends corresponding to an axis that is oblique to the longitudinal axis, applicant further claims that all the bends are either parallel or perpendicular to the longitudinal axis. Using the

same logic as provided by the applicant, the bending axis provided by applicant's drawings, namely, Fig. 3-4, would also be along a perpendicular axis. The examiner would further like to note that in column 3 lines 20-50 combined with figures 1-5, 9-12 of the Heinlen reference substantially indicate bends that are oblique with respect to the longitudinal axis. Referring to Fig. 4, applicant states that "contact arm 20 is bent upward at bend 50, in the transition between Fig. 4 and Fig. 5, the examiner fails to see where there is an upward bend at all.

Applicant further traverses the Section 102(b) rejection of claim 4 because the Office Action mischaracterizes the cited teaching of the Heinlen reference. The Office Action cites to Heinlen's outside leads (6 and 10 that each have an end portion 18) as corresponding to the claimed first and second connection conductors, and asserts that Heinlen teaches that a semiconductor device is applied to the end portion 18 of the outside lead 6. See, e.g., page 4:14-19 of the instant Office Action. However, the cited portions of Heinlen teach that a transistor is placed on the upper surface of heat sink 4, not on the end portion 18 of the outside lead 6 as asserted by the Office Action. See, e.g., Col. 2:55-58. Therefore, the Section 102(b) rejection of claim 4 is improper and Applicant requests that it be withdrawn.

The applicant argues that the connection conductors have been cited incorrectly due to a misinterpretation. The examiner would like to reiterate the portion of the reference which states "The outside leads 6, 10 are bent downwardly and have end portions 18 which extend over the upper surface of the heat sink 4 and past the edge 14. These outside leads have contact arms 20 on their ends which extend laterally in opposite directions and which are reversely bent downwardly towards the heat sink and inwardly towards each other so that the tips 24 of

these arms are disposed in front of the connecting strap 12 and immediately above the surface of the heat sink."

Furthermore, even in the parts cited by the applicant, wherein the reference states " the transistor or chip is placed on the upper surface of heatsink 4 with the tip portions 24" support the examiner's claim due to the fact that they refer to the tip portions 24 being the contact areas of the transistor. Regardless of the citations used in the office action, the examiner invites the applicant to consider the entire reference, along with the language of the office action to understand the rejections completely.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SWAPNEEL CHHAYA whose telephone number is (571)270-1434. The examiner can normally be reached on Monday- Thursday 9:30-7:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zandra V. Smith/
Supervisory Patent Examiner, Art Unit 2822

SC